

Claims

[c1] What is claimed is:

1. Apparatus for inspecting a composite structure having a matrix and a filler of individual members subject to uneven distribution in the matrix, said composite structure having a central longitudinal cavity, comprising:
a hollow cylindrical detection arrangement into which said composite structure is placed for inspection;
a source of radiation positioned within said central longitudinal cavity and operable to project radiation toward said detection arrangement through said composite structure from said central longitudinal cavity;
a detection medium carried by said detection arrangement and surrounding said composite structure;
said detection medium being responsive to said radiation provided by said source of radiation to obtain an image of the distribution of said individual members in said matrix.

[c2] 2. Apparatus according to claim 1 wherein:

said composite structure is a structural member of a mortar projectile;
said individual members are steel balls;

said matrix is a light transmissive thermoplastic;
said source of radiation is visible light.

[c3] 3. Apparatus according to claim 1 wherein;
said detection medium is photographic film.

[c4] 4. Apparatus according to claim 1 wherein:
said composite structure is a structural member of a
mortar projectile;
said individual members are metal balls;
said source of radiation is X-rays.

[c5] 5. Apparatus according to claim 1 wherein;
said detection medium is X-ray film.

[c6] 6. Apparatus according to claim 1 which additionally includes:
a solid state camera focused on said image of the distribution of said individual members to obtain a corresponding electronic image thereof;
a computer;
said electronic image being provided to said computer;
said computer being operable to analyze said electronic image and provide an indication of said distribution of said members in said matrix.

[c7] 7. Apparatus according to claim 1 wherein:
said detection arrangement includes a multitude of indi-

vidual sensors surrounding said composite structure; each said sensor being operable to provide a corresponding output signal in response to received radiation projected through said composite structure by said source of radiation; and which includes a computer; said output signals being provided to said computer; said computer being operable to analyze said output signals and provide an indication of said distribution of said members in said matrix.

[c8] 8. Apparatus according to claim 1 wherein: said source of radiation provides said radiation omnidirectionally.

[c9] 9 Apparatus according to claim 8 wherein: said source of radiation is an elongated strobe light.

[c10] 10. Apparatus according to claim 1 wherein: said source of radiation provides a directional beam of radiation; and which includes a motor connected to said source of radiation to rotate it while in said central longitudinal cavity.

[c11] 11. A method of inspecting a composite structure having a matrix and a filler of individual members subject to uneven distribution in the matrix, and having a central

longitudinal cavity, comprising the steps of:
placing said composite structure into a detection arrangement having a detection medium surrounding said composite structure;
placing a source of radiation into said central longitudinal cavity;
activating said source of radiation to project said radiation outward through said composite structure to said detection medium, said detection medium being responsive to said radiation to provide an image of the distribution of said members in said matrix; and
analyzing said image.

[c12] 12. A method according to claim 11 wherein said composite structure is a structural member of a mortar projectile, and said matrix is a light transmissive material, said individual members are metal balls and which includes the steps of:
placing photographic film in said detection arrangement as said detection medium;
placing a strobe light in said central longitudinal cavity as said source of radiation.

[c13] 13. A method according to claim 11 which includes the steps of:
obtaining an electronic image corresponding to said image of the distribution of said members in said matrix;

and

providing said electronic image to a computer for said analysis.

- [c14] 14. A method according to claim 11 which includes the steps of:
- surrounding said composite structure with an array of sensors, each operable to provide an output signal in response to radiation received from said source of radiation; and
 - providing said output signals to a computer for said analysis.